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ABSTRACT

This sabbatical report surveys some computer software presently being developed, already in use, and/or available, and describes computer use in several Massachusetts colleges. A general introduction to computers, word processors, artificial intelligence, and computer assisted instruction is provided, as well as a discussion of what computers can do for students and teachers of English and a consideration of potential problems. Consideration is also given to software evaluation, graphics, and the social, ethical, and political implications of computers in education. Recommendations are offered for Endicott College (Massachusetts) in using computers in course work. A 40-item bibliography and 91 reference notes are included. (Author/LMM)

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COMPUTERS IN THE WORLD OF COLLEGE ENGLISH

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to

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and

The Endicott College Community

August 21, 1984

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COMPUTERS IN THE WORLD OF COLLEGE ENGLISH

Now here comes noble verse, beloved of all English teachers, to set the tone for our venture into computers in the world of college English.

Twas global and the megabytes
Did gyre and gimbal on the disk;
All mimsy were the prompts and codes
And the software was brisk.

Beware the microchip my son,
The bits, the bytes and bauds and
such;
Beware the CRT and shun
The qwerty keyboard's clutch.

He took his self-pace book in hand,
Long time the menu key he sought,
Then wrestled he with the toaster
drive
And sat a while in thought.

Then as he sought that glitchy bug
The microchip, with gates aflame,
Came whiffling through the I/O plug
And processed as it came.

Asynch, Bisynch, all protocols,
His binary went snicker snack,
He felt it crash; and with a dash
He came galumphing back.

And didst thou tame the microchip?
Come interface my beamish boy.
O frabjous day, Callo! Callay!
O database, O joy!

Twas global and the megabytes
Did gyre and gimbal on the disk;
All mimsy were the prompts and codes
and the software was brisk.1

But this playful doggerel -- with apologies to Lewis Carrol and Alice Lyddel --is a far cry from the pronouncements about computers I was hearing and reading when I wrote my sabbatical proposal.

At an all-day workshop sponsored by Neccum, Dr. John Strange said that computers provide a better learning environment than the classroom, and degree-granting businesses such as Wang, IBM, Arthur D. Little and Bell Telephone might crowd out colleges -- if educators don't hurry up and get with it.2

Christopher Evans in his book MICRO MILLENIUM compared the electronic revolution to the industrial revolution and rumbled direly about educators who are Luddites.3

Alfred Bork, a California physicist, said that textbooks would probably vanish and very soon, teachers simply printing out whatever material interested them.4

Seymour Papert in MINDSTORMS talked about the 'Renaissance of thinking about education' that must result from computers and warned that schools and colleges had better transform themselves into something new or they will 'wither away and be replaced.'5

Dr. Eugene Galanter, director of the Children's Computer School, called the computer the 'new star in the constellation of fundamental knowledge. That supernova in the educational firmament is the ability to write computer programs,' he said. And further:'The importance of computers does not lie in their uses. Rather their value lies simply in their existence. . . computer literacy is good for the soul.'6

And perhaps the unkindest cut of all, a well-meaning friend, hearing about my sabbatical, rushed to my home not just to lend but to give me two books: BACKGROUND MATH FOR A COMPUTER WORLD, A SELF-TEACHING GUIDE and PRINCIPLES OF BUSINESS DATA PROCESSING WITH BASIC. As I studied them at the kitchen table, her words boomins in my ear -'Charlotte, I know your math is rusty' --I felt overwhelmed.

So far everythins I had heard or read sussested that computers were not the wave of the future but a tidal wave as close as Devereau Beach, a stone's throw from my study, ready to drown me if I couldn't run fast. I was carried back to the time when, with four children under the ase of five, I leapt out of bed each morninS panicked, knowins I was already four or five hours behind. That same anxiety accompanied the beginnins of my sabbatical studies. 'I'm too late already -- everyone else is way ahead of me! How can I ever catch up?' Such feelinss are, in truth, delusions. Not to worry.

For as the poet X. J. Kennedy described himself at an 'English in the World of High Technology' convention, though I was a 'virsin in the world of computers' I was ready to 'flins off my virsinity.' And apprehensive though I might be, many books, journals, magazines, TV programs and knowledseable people seemed eager to help me. As it turns out, a knowledse of deep, complicated and unfamiliar binary math is not a prerequisite of computer use. A friend and lons-time IBM-employed computer whiz ordered me to cast aside the math books. Welcome orders.

As William Zinsser says, 'I love to drive a car, though I have only a vasue notion of what is under the hood.'7 Like him I also love to fly in a plane -- recently to Mexico and to California -- but I've never once reviewed the law of aerodynamics. To enjoy the wonders of technology does not -- sood news -- require understanding them.

In the Old Testament sense,a sabbatical year is a time of release from debts, a chance to begin anew. Though my own creditors have been as unrelenting as ever, there is no auestion but that freedom from ordinary professional oblisations has permitted me to explore the world of computers with a thoroughness I never could have achieved otherwise.

A number of questions guided my progress in the world of computers. What was a computer anyway -- and what were word processors, artificial intelligence and computer-assisted instruction? What could the computer do for our freshman composition and other English students? What could the computer do for English teachers -- as writers themselves and as teachers? What software was being developed, already available or/and in use in English classrooms? What were other college English departments doing or thinking about doing with the computer? And since, in an imperfect world, good and evil are seldom unmingled, what were the potential problems, hazards, of computer use for students and teachers of English? On the grandest level, what were the social-ethical-political implications of computers in education? And finally, as a result of answering these questions, what would I recommend for Endicott?

WHAT ARE COMPUTERS?

Computers are machines that have two fundamental abilities : to accept instructions and to take in and manipulate information. As Dr. John Strange says, "A computer is nothing more than a large number of switches linked together in bytes, silicon disks. They are electronic devices that manipulate symbolic information according to a list of precise (and limited)instructions to perform a few operations."8

When most people say "computer," they mean a computer system. A computer system consists of a computer, additional devices for controlling and communicating with the computer, and adequate lists of instructions for performing some specific assigned task or tasks (such as printing payroll checks or quizzing students). Hardware is all of the physical parts that make up a computer system. Most systems include: some sort of input device such as a keyboard (which, ideally, is separate), that allows the computer user to feed information to the computer, some kind of output device such as a video screen by which the computer reports results to the user, and a peripheral storage device of some sort, a means of storing small or large amounts of information in a form that can be played back by the computer. 9

The lists of instructions that are part of a computer system are called computer software or just software. It is software that transforms the non-specific computer into a specialized teaching machine, paycheck printer, or record keeper. Like curricula, software comes in many shapes and sizes, but it all has in common that it delivers its instructions, called a program, electronically rather than through the printed page. These programs are written by people called programmers. Educational software is usally accompanied by a range of ancillary materials, including teachers' manuals, ditto sheets, workbooks, and tests. This total package of programs and ancillaries is often called courseware. 10

Almost everyone already owns computers. The calculator is an extremely simple computer system. You input numbers (data) and operations (instructions) via the keys. The computer calculates the result from step to step (processes each instruction as it receives it) and outputs results on the display. The input-process-output cycle is typical of most computer operations.

Obtaining results from a calculator is analogous to running a program on a computer. The major difference is the degree of visibility of this process to you. You are directlyinvolved with the minor marvels achieved by your calculator. The computer hides the process by which it achieves results. A computer also can be an electronic game, microwave oven, videoo tape recorder, or any other device that's "programmable" -- that accepts instructions and manipulates information.11

Just like stereo equipment, computer systems come as integrated packages or as separate components. However, all stereo equipments plays sound whereas your choice of computer hardware and software determines the tasks your computer system can do for you.12

The computer has two kinds of memory, Random Access Memory (RAM) and Read Only Memory (ROM). With RAM, data may move directly from any RAM address to the CPU (central processing unit) -- or data may move directly from the CPU to any RAM address. Turn off the computer and all data held in RAM is lost. It's therefore called volatile.13

ROM data may be read from ROM into the CPU but not vice versa. ROM is fixed, not volatile.

RAM is your workspace and ROM stores your programs. The catch is that computer memory, though steadily dropping in price, is still an expensive commodity. Small computers can seldom access more than about 64,000 (64K) 8-bit bytes of RAM and ROM together. Plainly, your own library of programs and data files should be stored in another way, in peripheral storage devices, not in RAM or ROM.

It's possible to store on magnetic tape devices, but magnetic disks are far better, because data can be accessed immediately. Floppy disk drives and hard disk drives are used for storage. For educational purposes, floppy disks make the most seense.14

The usual input device is a standard typewriter keyboard, the usual output device, a TV screen (monitor, video screen).

Endicott has a large Mini Computer called a DEC (Digital), and Endicott teaches Word Processing, Introduction to Computers, Basic, Basic Plus, Pascal, Fortran, Cobol and Computer Graphics with ten terminals from the Dec and four graphics computers. They are located in the academic computer center at the library.

What is a word processor?

Basically, a word processor is a system for typing any kind of text material into a computer and then editing, changing or correcting the typed text easily and efficiently. One authority defines a word processor as essentially a computer program that allows what you type to appear on a viewing screen (terminal) and gives you several editing features that enable you to modify -- add, replace, transfer -- the words you write. 'These editing features make word processing as profound a change from typing as Gutenberg's movable type was from fixed type.'15

Hardware, again, is all of the physical parts that make up a computer and any other components in its system --the keyboard, the screen(monitor), the CRT.

Software is a collective term for the sets of instructions that tell the hardware what to do. Individual sets of instructions are called programs. It is software that transforms the non-specific computer into a specialized teaching machine, paycheck printer, or record keeper. Like curricula, software comes in many shapes and sizes, but it all has in common that it delivers its instructions, programs, electronically rather than through the printed page. These programs are written by people called designers and programmers.

Educational software is usually accompanied by a range of ancillary materials, including teachers' manuals, ditto sheets, workbooks and tests. This total package of programs and ancillaries is often called courseware. 16

If the word processing program is used on a microcomputer, words are typed on the computer's keyboard. All typing then appears on a TV screen --monitor -- where it can be edited before the final copy is produced. The program that gives the micro its word processing capabilities is usually on a disk.

To take full advantage of word processing, you need a printer, the peripheral hardware that can put the words on the monitor on paper as well. The most expensive printers, DaisyWheel, produce copies that can be sent as manuscripts, letters, reports. Cheaper printers, dot matrix, the printer in the academic computer center, still produce printed documents with left and right margins justified, all words hyphenated properly, titles centered, pages numbered.17

The editing features of word processors can be used anywhere in the text you are writing at any time. You can add or delete anything from a comma to a sentence to a paragraph or move material around. The computers move the rest of the text as necessary. No need to cut, paste, retype, cross out, erase or white out.18

A word processor sometimes describes a machine in which a word processing program and a computer have been merged so that the machine's sole function is to enter, alter and format text: a dedicated word processor. The most common procedure, however, is to choose a word processing program that lets your standard computer -- main frame, minicomputer or microcomputer -- function as a word processor, too.19

Word processing teaches the basic steps in computer use: the user gives the computer information -- a story or letter or sabbatical report like this. The computer stores and manipulates that information on command, and the information is then called back in "processed" form by the user. As with any computer use, word processing requires that the user be precise and logical when giving directions to the computer.

What is artificial intelligence (AI)

Artificial intelligence is a branch of computer science that aims to develop machines capable of carrying out functions normally associated with human intelligence -- such as learning, reasoning, self-correction and adaptation.

With uncharacteristic fanfare, the Japanese announced their ten-year Fifth Generation Project to concentrate on AI in 1981. The United States' computer industry is more diversified in its research. 20

Dr. Strange predicts that by the year 2000, most computers will pass the Turing test. If a machine passes the Turing test, a human being can't tell whether he/she is talking to a human being or a computer!

John Seely Brown, researcher in artificial intelligence and psychology, has written a coaching program for a computer math game, "How the West is Won," which uses artificial-intelligence technologies to diagnose the strengths, weaknesses and misconceptioons of the user.

Brown explains what he means by high-level man-machine communication. "What we must do is put humans and machines on the same wave length. That's the power of conversation. As we talk, I'm slowly adjusting your mental model of me, and you're adjusting my model of you. When you ask a question, there's a chance to correct some subtle miscommunication. By asking, you implicitly review your understandings of all kinds of things. That gives me a chance to diagnose the cause of your misunderstanding and fix it."

"Communication is basically a repair process. When we can capture that conversational repair process, we'll have the new generation of man-machine communication." And that's artificial intelligence.

Voice-activated machines and voice-answering machines will be eventual refinements of AI.

Reporting on the first nationwide computer trade show devoted exclusively to software, Time Magazine noted that the most interesting products on display were offshoots of resarch being done on artificial intelligence, "a branch of computer science that teaches machines to simulate human thought."

The first visible results of this work, according to Time's reporter, are programs that allow users to put questions to a computer in everyday language rather than in convoluted codes or obscure commands. Instead of typing commas, colons, numbers and letters, an operator can enter requests as straightforward as "Give me the top five salesmen in Pennsylvania."

Two innovative firms, Microrim, from Bellevue, Washington, and Artificial Intelligence, from Waltham, Massachusetts, demonstrated programs that allow people to search for information in large main-frame computer data banks by posing questions in ordinary English. A new firm, called Menlo, based in Silicon Valley, California, unveiled In-Search, which allows callers to tap into Lockheed's huge Dialog bibliographic data base without the usual two-day training seminar.22

What is computer-assisted instruction (CAI)?

Computer-assisted instruction usually refers to any instructional application of computers. For English departments this means drill and practice programs, tutorials, dialogues, simulations or instructional games and word processing.23

Peter McWilliams lists three --among many --reasons why computers are an inevitable part of education's future: because personal computers are infinitely patient, theymake excellent tutors; because almost everyone under thirty living in this country was raised with --and perhaps on -- television, most young people feel more comfortable looking at a video screen than being with another human; because personal computers are interactive, a student may get more individual attentiion per day from a computer than per month in a classroom. 24

What can computers do for our English students?

Helen Schwartz argues that there is a subtle difference in favor of using the computer over paper and pencil and illustrates her argument with a story. "A psychologit's client was blocked, finding it especially difficult to articulate her feelings. The therapist, alone in the room with his client, said, 'Whisper it in my ear!' The client was able finally to examine his feelings by whispering them."

Creating words on a screen is like whispering, Schwartz says. It seems less threatening than the usual mode of articulation. Though actual writing is involved, the electronic text is ephemeral until it has been stored or printed. The writer produces her text as idea and does not need to commit herself in advance to producing her text as artifact. If it turns out well, she prints it; if not, it goes into the air. 25

Spellers, text editors, and Fry or Freisch readability analyzers point out corrections or possible improvements in a way students

do not resent, according to some educators. Studies show, also, that students who use such programs carry over what they have learned and apply it to other texts not run through such programs. 26

Writing can be greatly improved in organization because of the ease with which students can make abstracts of their papers by using the word processor. This they can compare with what they think should be in their papers. For this purpose, Schwartz suggests, students can first write a summary of what they intended to say, then mark the topic sentence or thesis for each paragraph in the body of the paper, thus enabling the student to check for sentence-paragraph cohesion at the same time. The word processing program loads only the marked sentences, easily creating an abstract so the student can see whether her 'intent' in her paper matches her 'performance.'27

Word processing is an excellent tool for revision and editing. Students often see revision as punishment, the price you pay for 'not getting it right' the first time, but the ease of trying different words and syntaxes with the computer, the neatness of the text even as radical changes are tried, encourages revision and editing.28

Quite aside from the computer's word processing potential, Dr. Ellen Nold of Stanford University sees tutorial and dialogue programs as ways to encourage student creativity by providing a fertile environment: privacy of communication and time. 'When students use good computer programs well, the computer provides a patient and non-threatening, fluid and provocative backboard against which to bounce ideas,' Nold says.

In addition to providing an atmosphere for creativity, Nold says computers can teach concepts and skills useful in understanding a subject. One of her own non-threatening teaching programs with a varied and interesting pace is described in the software section of this report. 29

Dr. Strange, who believes that most educational difficulties come from students' lack of confidence, also believes that the computer can build students' confidence in their own learning ability.

Dr. Richard Lederer, chairman of English at St. Paul's School, New Hampshire, and a designer of programs, lists a number of benefits of the computer for students: the format of CAI enlists the positive feelings that students have for monitors and keyboards to reinforce their verbal skills; each answer a student offers receives a specific response designed to lead him or herinto the paths of correctness and insight; the computer is a tireless drill-master available anytime the student cares to sit down at the keyboard and dial a lesson; the computer gets the students out of the classroom and"that in itself has some merit"; the student works on his own, independently.

Another benefit for students can be what TIME Magasine calls "Short Circuiting Reference Books." Students in some Eastern High Schools are enthusiastic about ACADEMIC AMERICAN, an electronic encyclopedia. Goal of its creators was to make an electronic encyclopedia so easy to use that students wouldn't need an instructional booklet. According to the reporter, students find using ACADEMIC AMERICAN effortless and fun. Other encyclopedia and reference publishers will undoubtedly follow ACADEMIC AMERICAN's lead.31

What can computers do for teachers?

Just as the word processor can improve student writing, it can also help teachers' writing. A number of books attest to its powers: Zinsser's WRITING WITH A WORD PROCESSOR; Peter McWilliams' THE WORD PROCESSING BOOK and Andrew Flueselman and Jeremy Joan Hewes' WRITING IN THE COMPUTER AGE: WORD PROCESSING SKILLS AND STYLE FOR EVERY WRITER.

Sarah Rolph, a journalist, describes what she learned when briefly wooed away from her trusty Underwood and reports on the experience of some other journalists and writers. The first thing Rolph noticed as a word processing advantage was the ease of making changes. 32 "If I realized in the middle of typewriting that putting my ideas in a different order would make more sense," she says, "I'd start coding sections -- 'Move X to top' or 'Insert

A here.' Once you get to insert F or G, you've had it. You just can't follow the trail well enough to keep writing --until you've retyped the manuscript." With a word processor, of course, inserts, no matter how long, are instantly visible in their new place.33

Another advantage Rolph noted was storing text in a small temporary file to bring back when she wanted to examine it for salvageable thoughts. Keeping such "homeless thoughts" on pieces of paper is confusing and bothersome by comparison, she says.34

Though Rolph is a professinal writer, the followins advantages she attributes to the word processor are as relevant for young student non-writers as for teachers. "This flexibility has influenced my writing. At the typewriter, if I can't find the right words, I'm likely to stop and contemplate. That can stop the flow of ideas. At the Word Processor, I feel more flexible. I'm not afraid to write whatever comes to mind -- because I can instantly delete it. The process of learning to write well is largely the process of learning to cross out your own words, however much you like them, if they don't work. The word processor helps that process along. Now that I've practiced on the screen, I'm more ruthless on paper, too." 35

Rolph says that waiting to print her words provides another advantage. When she sees her first printout, she reads it with new eyes. Because it looks different on paper, it's easier to catch typing errors and to edit. This new objectivity would be just as true for students and teachers.

Rob Ross, a medical/science writer, uses different symbols to denote different kinds of information, such as notes and bibliographic entries. He shuffles the pieces electronically, just as he would rearrange index card. "I don't know how I lived without it," he says. 36

Richard Ryan of the Boston Globe says, ". . . if you're the kind of writer who enjoys experimenting with the way words fit together, the word processor is a great advance in wr itins, because as you do this experimentins, you always have in front of you clean copy. The alternative, if you're workins on a typewriter, is a sea of crumpled paper.

Hal Rodgers, former editor of Technology Illustrated and Popular Electronics, says he works faster on a word processor. "It magnifies my concentration," he says. "I forget what time it is." "I hate to revise on paper," he says, "so I normally assemble a document mentally, then begin to write. With a word processor, I tend to start working earlier. THe stuff I put on a word processor is more tentative, because the medium is more forgiving."37

Schwartz says computer aids offer teachers "ways of implementing theory and recommendations which have seemed impractical before. We can be the kind of teachers we have wanted to be all along . . . In the course of a semester, if we keep ourselves open to innovation, we can use our own experience and expertise to guide us in adapting the available and developing computer aids for systematic, individualized instruction throughout the writing process." 38

B. F. Skinner believes the computer can give students a valuable sense of power. "I think that sense of power is a great thing," he says. 39

What about the computer as a tool?

Over and over again, in interviews, courses and readings, I encountered the word "tool" in connection with computers.

"How do you see the computer influencing teaching?" I asked Susan Foote, coordinator of Instructional Technology, Bureau of Educatinal Resurces and Television for the Massachusetts Department of Education. "It is simply one more tool," she answered.

TIME Magazine ended its "Computer Software, The Magic Inside the Machine" issue with that image: "Since the invention of the primitive hand ax, humanity has turned to tools as a way of making life easier or work more productive."

Quoting Thomas Carlyle, TIME continued, "Man is a tool-using animal. Without tools he is nothing, with tools he is all." The

article concluded that computer software is only the latest of those tools, and programmers are only beginning to understand the true potential of software.40

Seymour Papert says that sex, race and socio-economic background appear to be irrelevant in determining the extent to which students can use the computer as a tool for learning.41

Michael Rossman, a teacher and writer, has some warnings about this new tool: 'Every tool handled in continuous use leaves its distinctive imprint on the flesh, as in the blacksmith's blackened knuckles and great biceps. The computer is a mind tool, humanity's first since the book, that will leave its imprint on the flesh of thought itself, shaping our development to fit its demands.

The danger, Rossman says, is that young users will (involuntarily, unconsciously) model their own thought processes to fit those encountered via the computer, and they are only the most readily mechanizable aspects of something more whole.

For example, Rossman argues, students must first sit for hours with paper and pencil, with watch and thermometer, recording the speed of dawn's warming, gathering the raw data themselves before they make use of computers for the task. This, he says, ensures that the tool is experienced as a sensitive extension rather than as a numb and numbing crutch. You can't really know what's gone into a process until you've done it yourself.' 42 Something to think about in connection with spelling programs.

Roger Rosenblatt gives a subtle analysis of the computer as tool:'Often in history man makes what he needs. In one sense, he made the computer because he needed to think faster. In another, he may have needed to define himself more clearly; he may have sensed a need for intellectual humility. If he needed intellectual humility at this particular time, it may be a sign that he was about to get out of hand again, and so these contraptions, of which he pretends to be so fearful, may in fact be his self-concocted saving grace. The mind is both crafty and mysterious enough to work that way.' 43

Another educational computer specialist says the computer is a tool like any other, but it is -- in the sense of any tool people use that is an extension of some human capability or trait -- a prosthesis.

Marshall McLuhan refers to the computer as a prosthesis in assistance of human intelligence. The computer may thus be considered as an intellectual prosthesis or an amplifier of human intelligence. As such, it is almost unique among tools since most tools are extensions of physical rather than intellectual human qualities -- for example, tools that augment capabilities such as locomotion, speech, grasping power and so on. Like the automobile,

Peter Patton adds that the computer is a tool that has multiple levels of utility. Just as one can use the car for personal transportation in several different modes, such as using a taxi, or being driven in one's own car, or being driven in someone else's car, or driving one's own car, so the computer can be dealt with on several different levels of personal involvement. 44

Dr. Ellen Nold quotes Spinoza, "So long as a man imagines that he cannot do this or that . . . so long will it be impossible to him to do it." What is preventing humanists from using the computer for humanitarian purposes, she says, is merely their belief that they cannot use the machine. The truth is, according to Nold, that the computer can provide a unique learning experience for students and that teachers can be fully in control of that experience, just as they pick the books to be read.

A student responded to one of Nold's computer programs this way:

> A computer cannot substitute for a teacher, just as a book, film or videotape cannot. Nothing can take the place of a good teacher. However, a good teacher can and does use available tools, and the computer . . . is one such tool. 45

What software is being developed, already availalble, or/and in use?

One of my best friends recently celebrated her 84th birthday. She is a deep-dyed New England merchant-class Yankee, crushingly imbued --like many of her and my vintage -- with the Work Ethic. When she discovered I was to get a sabbatical -- and for a whole year, too -- she was horrified. Aghast. ". . . couldn't you get enough vacation in two months?" To reassure her -- and also because I thought it was the truth; honesty really is the best policy -- I said, "Oh, this won't be any vacation. This may be my last chance to make money! You know, I hear there really isn't much good English software yet and I'm going to devise a really brilliant problem-solving program. It will sell like hotcakes. I'll be rich." I can't tell you how relieved my friend was. Making money, now, that was all right; that she understood. And how especially commendable that an English teacher, that most dreamy and impractical of humans , would be thinking so sensibly. She instantly saw me in a new light, the go-getting money-maker.

Well, I was right about one thing, the shortage of good software for college English. I was wrong about its being possible to write the sophisticated, problem-solving program I envisioned in a year.

One computer mogul says, "The days of giant royalty payments are gone for good." Another adds, "With rare exceptions so has the eminence of the solitary programmer." The latest personal-computer software is too complicated to be written by an individual. From eight to twenty-four people need to cooperate on a program!46

Seymour Papert explains why software that creatively uses the interactive capabilities of the computer is in such short supply. The first use of a new technology is always to do what has already been done without it. The first cars were considered, designed and treated not as if they were a NEW technology but as if they were horseless carriages. Their running boards and high seats

actually ressembled bussy cabs. The first movies were nothing but plays acted in front of a camera instead of a live audience. It took a whole generation for the new art of motion pictures to emerse. In the same way, what has passed for "computers in education" has tended to stay at the stage of putting old instructional methods into the new technology, Papert points out. 47

The maxim, "However much you study, you cannot know without action" was updated by the psychology professor at a men's school, "You can study Freud all you like --but sooner or later you're going to have to go out with girls." The beauty of good software is that it leads the student to action -- and though there is still -- in 1984 -- not much good educatioonal software available, excellent programs are alleged to be on the way.

Software decisions come first. Software is the most important part of computer use. Teachers need to find and evaluate the software that will best serve their purposes and only then buy the hardware that runs it. The problem with computer companies' tax-deductible gifts of hardware is that schools often get stuck with hardware before they have made software decisions -- and the so-called "gift" becomes a noose around the neck, cutting schools off from the software that best meets their goals, according to Dr. John Strange.

Of course schools are also capable of buying hardware without first analyzing their needs with the same results: they can't or don't use it. Educators warn that purchases without the involvement of the users guarantees failure. 48

Getting to evaluate software, alas, is outrageously difficult, short of going to computer software conventions. And what you see at a convention may be a long way from the market. Unless you already have the hardware a program runs on, you can't evaluate it at your college -- and software companies don't make it easy.

The director of freshman composition at Emmanuel College describes her frustration in this regard. She says she was interested in Scribner's "Homer." However, Scribner's told her the only way she could see it was to buy it, evaluate it, and return it if it didn't suit her!

Other software manufacturers prevent the copying of programs for multiple use. And according to Ken Komoskie, director of EPIE, Educational Programs in Education, the warranties of programs must be examined carefully; they tend to be no warranties at all. He says that teachers will have to express themselves vigorously before such issues are resolved.49

Because of the difficulty of getting to see software, I shall describe in some detail English programs I have seen or heard or read about to give you a sense of what is being developed.

Software programs for CAI are chiefly of five types: drill and practice; tutorial lessons; dialogues; simulations and problem solving lessons and games. Word processing programs, which may include spelling and syntax checkers, are the fifth instructional use.

Drill and Practice Programs

Just as teachers who do not teach writing tend to assume that grammar is what it's all about, so teachers beginning to consider CAI tend to think that drill and practice programs are the computer's best use. After all, drill and practice does take advantage of the computer's infinite patience and ability to repeat endlessly, often generating new questions as well. And drill and practice is indeed useful, though it does not use the computer as creatively and interactively as the other types of programs.

Drill and practice programs are the easiest way to use the computer. Since such programs were all that was commercially available or easily written in-house, many colleges rushed into them, discovering too late that the programs did not really meet their needs.

As Dr. Ellen Nold says, 'The prevalent pedagogical style of existing teaching programs is 'drill and practice,' a style favored by behaviorists and others who demean the human mind into a simple Stimulus-Response machine. Humanists, don't forget that computer programs can be written in many other modes more suited to humanistic assumptions!' And she adds, 'If the computer

teaching programs developed so far are unimaginative and dull, the author, not the computer, must take responsibility."50

My first sabbatical act was to visit Dr. Richard Lederer at St. Paul's School. I had heard him speak at an English convention. You might say he was my inspiration for the idea that I could write computer programs. Knowing no more about computers than I did at the outset, he had nevertheless created a whole menu of instructional programs, four preparing students for the SAT exam, five covering noun functions, four on phrases, three on clauses with a final phrase-clause review.

Lederer's programs are a combination of drill and practice and tutorial, inasmuch as every wrong answer introduces a frame to jog the students' thinking. I was impressed. My only criticism, not voiced to him, was that I didn't get as much praise and support for my right answers as for my wrong answers. "Good, Charlotte! That's almost right!" the machine would chortle to my blunders. When I got a problem right -- as I did occasionally -- the program merely plodded unsupportively on to the next frame.

Impressed though I was with Lederer's creations, that trip threw the first clinkers into my own heady dreams of cornering the software market. Lederer had spent from 150 to 200 hours designing his menu of programs. A St. Paul math teacher, a computer maven, did the programming. And the result was useful, exciting even, but a far cry from the program I had hoped to design.

Equally daunting was the news that a friend, Dr. Mary Gainer, English professor at the University of Massachusetts, Boston, working with three colleagues and funded by a small grant, had spent three years writing a spelling program -- and this program was straight drill and practice. Dr. Gainor questioned how many students would be glad to use it when it got into their hands.

My reservations about drill and practice programs at the college level began before my sabbatical and have been confirmed by it. Drill and practice usually means linear programs that present line after line of data without deviation for error or for the student's background. It is this linear nature that makes them relatively easy to write -- faster with fewer bugs , and this

explains their popularity with teachers. However, definitive studies have established --- years ago --- that grammar drills with pencil and paper are not automatically good for students. I have watched students turn off completely to programmed-learning texts. Why should such programs work better on a computer? The novelty of computers, the pride at being involved with 'new technology,' might turn them on for awhile, I suspected, but frame after frame of drill -- or message after message saying, 'Sorry , Susie, not right yet . . .' would eventually turn them off as definitively as did programmed texts.

Readings, interviews and convention presentations have confirmed my wariness. William Wresch reports, 'in an attempt to determine the effectiveness of PLATO, a huge collection of drill and practice programs created jointly by the Control Data Corporation and the University of Illinois, the Educational Testing Service in 1975-76 undertook a major evaluation. ETS monitored the use of PLATO in five community colleges in Illinois. Four thousand students per semester used PLATO programs as part of courses in accunting, biology, chemistrey, English and mathematics.

At the end of each semester, when students who used PLATO as part of their courses were compared to students who took regular courses, the ETS found that 'the PLATO system had no consistent impact on either attrition or achievement.' ETS went on to report, 'among 23 populations examined for achievement, there were eleven positive PLATO effects and twelve negative PLATO effects. The few significant effects for either outcome could be plausibly explained by instructor differences.

'This is not to say that PLATO did anybody any harm,' Wresch adds, 'students seemed to like using it and as long as equivalent achievement can be maintained, why not give students that opportunity -- if your college can afford it? But it does mean drill and practice CAI is not the answer to underachievement in English or anything else. Data sequencing and immediate feedback alone do not seem to be enough.'51

The director of the freshman program at one fairly-selective four-year college echoes this early study. She inherited 18 to 20 grammar drill and practice programs written by the previous director -- and she inherited strict instructions for their use.

For the one developmental English class, 15 students, each student spends one extra hour a week going through the complete series of grammar programs. "They love doing it," the director says. "They repeat each program till they get 100%, and that pleases them, even though the programs themselves are not very positive-reinforcing. But I must admit I don't notice any transfer to their writing from all this work," she says ruefully.

Dr. Eugene Galanter, director of a computer school, says many administrators and educational publishers are attracted to the notion that the computer is right for subjects that traditionally used flash cards for their comprehension and "whole suites" of such programs abound. However, he says, Dr. Mary Alice White of Teachers College, Columbia University, has reviewed these programs and states categorically that 80% are worthless, 19% marginally useful and perhaps 1% of some value.

Galanter warns that the computer, so miraculous-seeming to adults today, will be just one more taken-for-granted electronic machine to today's children -- and drill and practice programs will be just as boring to them as programmed workbooks are to this generation.52

Tutorial Programs

Tutorial programs plunge the student into action. Their major difference from drill and practice is the use of branching.

Wresch says, "Where drill and practice plods inevitably from one frame to the next, whether the student is knowledgeable or not, successful or not, tutorial CAI moves from one frame to another depending on how the student has performed on previous frames. If the student has a series of successes, the program may branch to a more advanced series of frames; if the student is making errors, the program may branch to frames that explain concepts the student is having trouble with, or even to a whole series of frames that supply background the student is clearly lacking." 53

Also, tutorials are better able to maintain constant and instant individualization. No two students will be presented the same series of frames . . . or presented material above or beneath her

ability. Every student constantly faces a screen full of data that gives her the optimum opportunity to succeed. 54

The shortage of good tutorial programs is not hard to figure. While drill and practice requires only a single sequence of questions or exercises, tutorial programs require the maintainence and searching of a memory for each student, a branching mechanism, plus multiple strings of frames of differing difficulty. Writing such a program requires programming sophistication plus huge amounts of subject knowledge.

The teacher/programmer has to be prepared for every possible answer a student may give and must make decisions in advance about which answers will be accepted as correct, which judged wrong and which sequences of frames to display as the consequence of a student's answers, Wresch says. Since this is impossible to do except with factual and objective material, tutorials have limited usefulness.

Dialogue Programs

In dialogue systems, the student is free to construct natural-language responses, ask questions in an unrestricted mode, and in general exercise almost complete control over the sequence of learning events. The computer seems to understand the student's responses and then prods him/her into the next step in the composition process.55

The first such system, Wresch says, was created at the University of Michigan in 1973 by Robert Bishop for use in journalism classes. "Bishop's approach calls for students to be given the information they would need for a news story -- who, what, when, where, how. Students then each sit down at a computer and type in what they think would be a good story on that event. Bishop and his colleagues, meanwhile, have programmed the computer so it has a list of key words which they think should be contained in this particular story.

In an assigned article on the collision of two navy vessels, for example, the program was to search for the complete names of the ships involved, the time of the accident and its location. If

students left such information out or did not include it early in the story, the computer typed out an error message which read, "Be sure to report near the beginning of the story when the accident occurred." If, on the other hand, students included the names in correct form and early in the story, the computer typed out, "Good. You have identified the destroyers by name, base and flotilla number early in the story. This is important to readers with relatives or friends who may have been in the accident."

With the aid of this computer program, journalism students are able to practice writing stories and get instant responses to their work. It should be noted, however, that such practice is never intended to substitute totally for teacher reactions. This computer program, for instance, while able to note the presence or absence of keywords, cannot correct grammatical errors or look for stylistic features such as emphasis and organization. Responses of that kind are left for the classroom instructor. What the computer is able to contribute is additional after-class experience in writing.56

Another dialogue system Wresch describes was created by Hugh Burn of the Air Force Academy to help students prewrite:

Computer: Take a mental photograph of Dreiser's dramatic technique. Describe one important detail.
Student: I don't understand what you want me to say.
Computer: Concentrate now on seeing Dreiser's dramatic technique. What feature stands out the most? Describe. Your turn, Karen.
Student: Like the setting?
Computer: Yes, that seems o.k.
Student: The factory vs. the hotel.
Computer: That's the idea, Karen. Give me some more information.
Student: I see Hurstwood as a scab. Though he's been reduced, he still has some dignity, but the settings aren't dignified. The streets . . .
Computer: Go on, Karen. . .
Student: The streets are ugly, a dismal contrast.
Computer: Super, Karen.

According to Burns, Karen continued with the questioning for forty minutes and left the computer center with eighteen pages of trasnscript which she could then use to help during the writing of the essay.57

Ellen Nold emphasizes the humanistic possibilities of computer software. Here is an example written in the mid-70's of a truly humanistic use of the computer for a dialogue program. (The computer signals that it is ready to receive the answer with a colon, and the student types in his/her answer on that line or lines.)

Hi. What shall I call you today
: Sue
O.K. Sue. This time we're going to talk about what we can and can't see, hear, touch, taste and feel. You just touched the computer terminal. How does it feel?
: shaky
Fine. Now say it again in a different way. I t feels like . . .
: a trembling bird
Good. Even more far out? It feels as if . . .
:it were going to fly away
Believe it or not, you've just written a poem. Here it is:

` TERMINAL
Shaky
Like a trembling bird
Just as if it were going to fly away

Want to change the poem to make it better?
:I think I'd like to
Good. Type in your new poem, using the next three lines.
:sometimes my mind
:like a trembling bird
:feels like flying away
That's the way!
(If the student had not wanted to pursue the revision of the poem, Nold says, the computer would have typed: 'I thought your poem was o.k., too.' The program goes on to explore the notion of concrete and abstract words in the context of poetry --its teaching goal.)
Now think about the things you normally can't see, hear, touch, taste, or feel -- like love or hate, joy or desperation. Can you point to 'desperation' the same way you point to a desperate man?
:Yes, I think you can --in the same way you can 'feel' love.
Well, you can describe desperation, but it would be kind of hard to point to.

A poet (like you) can touch an abstract idea like desperation with words. Desperation feels like . . .
: rats gnawing at the pit of your stomach
Yeah. Desperation tastes like . . .
:your mouth when you wake in the morning
Uh Huh. And desperation looks and smells . . .
:sour like old lemonade
That was harder, . but now we can see, smell, taste, and touch desperation. Want to go on?58

Most students, Nold says, do go on with the program, choosing another abstract idea they then make 'sensible'; the computer fashions their responses into another poem, using the details they have conjured up and then compares the feeling expressed in the student's poem to another poet's. The most common reaction to this program (written in a mode Nold calls 'discovery and surprise' because it elicits the student's response and then surprises him with it) is 'Gee, that made me think' --a reaction most gratifying to a teacher.59

Another 'discovery and surprise' program designed by Nold teaches logical fallacies.

Hi there. What's your name?
:Lynn
This program, Lynn, is abut fallacies of relevance. Do you know what a fallacy is?
:not really certain
Logicians define the word fallacy as an error in reasoning or in an argument. A conclusion that does not follow from its premises is called a non sequitur. (Latin for 'it does not follow') All fallacies are non sequiturs. Here are the names of four kinds of fallacies:
1. Appeal to pity
2. Bandwagon
3. Argument against the man
4. Argument by force
Now here's an argument: 'Don't convict me, Judge! Sure, I stole the money, but if I go to jail, my wife and six kids will starve!'
Which kind of fallacy is this?
:appeal to pity

Right. What about this argument: "Listen, John. It's pretty unwise not to vote for the Labor Party. There have been some . . uh. . . nasty incidents." Which fallacy is this?
:force
Right again, Lynn. Now you write a bandwagon argument. I'll start it. "Mom, I've just got to see "The Exorcist" because . . ."
:all my friends are going
I was thinking about that answer, too. What's an argument against the man?"
:one where you argue against a personality
o.k. Here's an example: You can't believe anything Senator Snort says. He's not a good Catholic, and he tells dirty jokes."

The program goes on to explore eight more fallacies -- each progressively more difficult to understand -- and ends with a review.60

Simulations, "Microworlds," and Instructional Games

Simulations, "microworlds," and instructional games are forms of CAI which have in common the advanced thinking and problem-solving skills they require -- not a mastery of content. Computerized board games like "monopoly" are simulations. Computer simulations exist for the Three Mile Island nuclear reactor and the human circulatory system. The design and programming of such simulations and of instructional games is so difficult that they will enter higher education for English slowly --but their is no limit to their possibilities.61

One excellent example of an instructional game is "Snooper Troops."

> Students receive a dossier on a crime, complete with newspaper clippings, eye witness reports, photographs and descriptions of key people associated with the crime, a worksheet for scoring clues, and a list of phone numbers to call for further sources of information and clues. Different groups receive different sources. In turns, student groups are allowed

up to the computer where they type in the number of their group and receive information. Students can raid sources, tap files and discover new sources by using computer clues effectively. In the process, they read, write, think and solve a mystery.62

The kind of learning that "Snooper Troops" fosters is extremely powerful. Not only do students have to gather facts, make inferences and test hypotheses, but they also have to anticipate outcomes, plan alternative strategies and negotiate with group members based on processing information. These are the essential elements of most reading, writing and thinking in the real world. 63

One key element of games of this type is that they foster activity, discussion and problem solving away from the computer. The computer is used only when its special characteristics are needed.

A computer math game called "How the West is Won" monitors how children play the game and then artfully intervenes to suggest ways they can do better. Some may be weak in math, for example, while others get into a strategic rut after playing several games. "West" diagnoses which kind of problem children are having and helps them overcome it.

"West does not simply leap in and tell a kid how he's goofing up," its designer, explains, "because you destroy the fun of the game that way. The trickiest part is knowing just the right time to break in and how much to say. Sometimes you merely want to leave a clue behind. Just give him the right piece of information to fit into his current mental model to make it more robust, but let him come to the final understanding."

Chris Crawford and Bill Budge are two commercial game creators famous in the world of computers. "To make a game, we create a small world -- a micro world," they agree. "If it is interesting at all, you can't predict what will happen. There is some kind of serendipity involved; something is discovered during the project.

They spend a year, over 2000 hours, creating games and feel

responsible that their games have some "meat," something to offer. Future games, they believe, can incorporate more of the human fantasies of the player, fantasies the player can walk into and live in. They want to create bigger and better worlds --maybe a solar system construction set where planets will collide if not spaced properly -- or a doll house like the Smithsonian Institution with people walking around in rooms.

Asked if they were worried abut the young whiz kids ready to knock them off, they said, "you don't learn to design at a computer. You learn to design by interacting in the world. A young generation that spends most of its time with a computer and not enough with the world won't be writing games!"64

The possibilities of such microworlds for the teaching of literature and for honing thinking are thrilling to contemplate.

Helen Schwartz has developed a program, SEEN, which helps students to develop a thesis and supporting evidence, to debate with other students in a non-threatening environment, to overcome the "blank page" syndrome of Writer's Block, to write more without increasing teachers' workload. SEEN is an interactive, non-judging computer program which helps students to see more in what they have read or observed by using a tutorial and then communicating with other students on a computer network about the ideas each has developed in the tutorial. This "electronic blackboard" permits the exchange of papers between students and peer critiquing.65

Word Processing

The use of computers for word processing is the use of computers in the teaching of writing that has had the most successful use so far. What has already proved effective in the non-educational world has, of course, the advantage of preparing students for what they will find in the post-graduation working world. Using the word processor permits the student to make all manner of changes while maintaining a clean copy, spares her tedious retyping of drafts, encourages a more hopeful, positive approach to writing tasks, and seems to enhance motivation, the most important determinant of success in any academic work.

The positive shifts in student attitudes towards composing with the use of word processing are indicated by Mimi Schwartz's research. A report of Dr. Schwartz's findings is in the appendix.

Spelling checkers or word processors like Homer, Writer's Workbench, and Grammatik, which can be used to search student texts for certain errors in usage or various stylistic features are useful back-up programs to word processors.

"Writing Is Thinking" is another such program. It has four forty-five minute sessions of instructions, featuring the three stages of writing as stages of problem solving. The first session helps the student to analyze the problem with planning, brainstorming, writing opinions; the second, to develop the structure with selections and outlines; third, to develop the structure further, with paragraphing, writing facts; and four, to evalutate the design and revise and edit. "Writing is thinking" claims to have three unique features: enabling the user to complete the text; enabling the user to acquire skills (communicating with facts clearly) and -- a bonus -- enabling the user to think more logically.

WRITER'S WORKBENCH is a collection of programs developed at Bell Labs to automatically analyze the style of technical documents. It is used at the University of New Hampshire and James Moore of North Shore Community College recommends it.

DRAFT is being developed at the Carnegie-Mellon University writing center. It's an integrated text-editing, information-management program to aid writers while they are cmoposing. A second program trains students to detect textual problems which need revision.

EPISTLE, under development at IBM, detects and corrects grammatical errors in text, as well as analyzing style. The Carnegie-Mellon writing center and English department are working closely with IBM to test and further develop both industrial and educational applications.

According to Helen Schwartz, initial studies suggest that students do not resent the error-hunting aspect of such "processing" and that they carry over what they have learned about style and apply it to texts that are not run thrush a program.66

One well-known word processing program is Bank Street Writer, a program with the advantage of being extremely easy to use and

learn but the disadvantage of being slow, taking up space in RAM, and processing a small amount of text.67

VEDIT was used at the 4C's preconvention and Word Star is the choice of many teachers.

Wandah is a program presently being developed which includes word processing and prewriting and revision aids.

The Find and Replace capacity of many word processing programs helps a writer who can identify her characteristic misspellings. For example, the student who has a particular problem with 'your' and 'you're' can search her text from beginning to end for every occurrence of these words, correcting their usage as she searches. This concentration and repetition reinforces the rule the student is learning. 68

Problems with the Computer

Since in an imperfect world, good and evil are seldom unmingled, what are the problems students and teachers of English may encounter with computers?

X. J. Kennedy warned at the 'English in the World of High Technology' conference that computer printouts can look so publishable that the writer doesn't even notice he's made no sense at all.

Kennedy described a Vermont writer-friend, Max Steel, who tends to be repetitious. He has a word processor that warns him when he's overused a word. 'What if Shakespeare had had a word processor,' Kennedy speculates. 'He was fond of the fawning dog image and melting candy, but his computer would have warned, 'No, no, Will, scratch that fawning dog! You used it in Othello.'

William Zinsser points out that if Abraham Lincoln had written on a word processor instead of the back of an envelope, he might have written '87' instead of the sonorous 'Four score and seven years ago . . .' In fact, Zinsser says he's become so fond of revising and compressing his text with his word processor that he can forsee the day when he cuts out more than he has written!69

The dilemma for teachers in evaluating software is that , one, it's hard to get hold of software to evaluate and two, its even harder to come by the hardware to run the software. And there's no justification for buying the hardware unless the software that runs on it is evaluated as good.

A breakdown in a main frame can end the work of all the students working on terminals from it. This is a particular problem at Endicott.

And of course dramatic --or hilarious -- blunders frequently appear in text translation programs that rely on word equivalences and that attempt to function without an analysis of meaning -- like the following example: 'The spirit is willing, but the flesh is weak' was translated 'The whisky is fine, but the steak is not so good.' This does not seem farfetched in the least to any English teacher! Papers written by students with small vocabularies --most students, in other words --who lean heavily on thesauruses abound in such comical errors!70

Isaac Asimov, who is enthusiastic about the computer, worries only about its possible use for mind control. Neil Frude points out that the computer becomes more effective as a teacher the more friendly, approachable, reinforcing and easy to use it is; thus manufacturers and academic researchers are examining those features that make programs inviting and accessible to nonspecialists. The notion of the 'Christian computer' has already been introduced, and a machine can be equally committed to any other moral or political system. A high credibility factor is associated with the computer and the experience of interacting with it may further increase its powers of persuasion. Its possible dangers as a mind controller are suggested by this.71

In a small and admittedly inconclusive study, Richard M. Collier points out certain strengths and weaknesses of the word processor for teaching writing at this time. He says, 'The word processor encourages concentration on the smaller domains of a text by making minimal alterations easy and larger alteratins difficult. Inexperienced writers thus become entranced by the superficial and rather than performing conscientious planning of extended stretches of text, they play with the word processor somewhat as if it were an Atari Computer Game.72

Though Mimi Schwartz's larger, more conclusive study points to quite different results from the use of word processing in composition, it is interesting to note Collier's other observations. (A report of the Schwartz research is in the appendix.)

Other data from Collier' comparative study:

The revisers with the weakest typing and text editing dexterity were those who most fervently wished to return to the handwritten format.

Since only the current page of a text is availalbe on the screen, thinking of the composition as a whole becomes quite difficult, and thus equipment which it was hoped would encourage a more holistic view of writing seemed to encourage a more fragmented view.

Editing in the smaller domains does not seem to add to the effectiveness or quality of the final product.

The text editor did not encourage the subjects to make serious and elaborate additions to their essays; in fact, they made somewhat more substantial additions when revising by hand.

Inexperienced writers were somewhat more careful of problems in surface structure when revising in the traditional fashion. 73

How should English teachers evaluate software?

In their excellent article, 'Choosing Software for the Composition Classroom,' in the February, 1984, COLLEGE COMPOSITION AND COMMUNICATION Journal, Professors Bruce T. Petersen, Cynthia L. Selfe, and Billie J. Wahlstrom provide seven criteria to consider when examining software designed for use in process-based composition courses. They are so excellent that English teachers need look no further for guidance.

Criterion 1: Does this package address significant writing problems? Any package that is going to be useful in a process-based composition program has to address students' REAL writing problems, not simply their difficulties with spelling, grammar and punctuation. As teachers, we know that these surface-level aberrations are the very least of the writing problems our students demonstrate to us. The kind of software we

need deals with the infinitely more complex and more primary problems of purpose, audience, planning, organization, development and logic.

Criterion 2: Does this package have a true process orientation? As composition teachers we recognize that we must teach our students HOW to compose -- offering them a variety of heuristics for inventing, focusing, planning, drafting, revising and editing -- if we hope to make them more successful writers. Any software we adopt shuld support this approach, either by addressing one part of the composing process -- as Hugh Burns has done with his invention programs -- and suggesting the remainder of the process, or by guiding students through the entire process.

Criterion 3: Is this program rhetorically specific? As teachers of writing and as writers ourselves, we know that our writing strategies are affected by our audience and our message. Hence, the software we use in our composition classrooms should suggest to our students that they may have a different set of concerns with -- and a different approach to -- each writing task and each rhetorical situation. The ideal program for composition courses would offer students a range of writing strategies and techniques to include in their personal repertoire for use when the appropriate rhetorical context arises.

Criterion 4: Will this program make stuents write? Although this question seems obvious, it is the one most often ignored by the software currently marketed for English and composition classrooms. The basic assumption of our composition program is that students learn to write by writing. Our students will become more successful writers, we believe, when they practice the techniques, strategies and heuristics we teach them. They will find out for themselves what works and what doesn't as they write stories, memos, essays, journals and reports. Beginning writers will not learn to write by identifying those sentences that employ commas correctly, an exercise which formed the basis for the last software module we examined.

Criterion 5: Does the program accommodate a range of writing skills and experiences? Perhaps the first lesson that any writing teacher learns is that no two of her students compose in the same way, use the same repertoire of skills, or draw from the same set

of experiences. To be of use to teachers, software must be flexible enough to serve the range of the writers who inhabit our composition classrooms. Any well written program must store process-oriented composition instruction on several different levels of abstraction or complexity and give access to higher- or lower-level explanations and practice exercises as they are needed by individual students.

Criterion 6. Did the development of these programs involve specialists in both composition and software design? Creating scripts for effective software -- that is the texts describing what the computer shuld say, how it should ask for responses, where it shuld branch to provide varying levels of instruction, and what content it shuld cover -- requires training in rhetorical and pedagogical theory. In other words, it requires good teachers. But good teachers cannot create effective software alone. The best scripts are useless until they are translated by software-design specialists into efficient and accessible programs. The software-design specialists are familiar with hardware limitations, the potential of various programming and "authoring" languages, and the art of dividing scripted texts into subroutines, procedures, or records that a computer can handle as fast as students can type in text. Neither the English teachers nor the software-design specialists can do the entire job by themselves.

Criterion 7: Have these programs been field-tested? Any software not thoroughly field-tested on the population for which it was designed is still in the first-draft stage. Students find ways to sabotage even the best and most carefully conceived software. They muddy the waters of the clearest directions, choose alternatives that don't appear on the screen, and quit in the middle of a 30-minute program to grab a cup of coffee at the student union.

What are other college English departments doing or thinking about doing with computers?

Colleges and universities in and outside our area are using computers in a great variety of ways. Though I interviewed English educators at all the colleges in NECCUM and many others in

our area, the following reports of those interviews may already be dated. Colleges can go from no use of computers to extensive use with great speed, once they have done the ground work -- decided what software is best, learned what hardware runs it, and accumulated the right number of dollars -- or grants. Many area colleges are presently in that groundwork stage.

But first, be dazzled by the colleges making full, massively funded use of computers.

DREW UNIVERSITY. Of particular interest because it is a liberal arts school, Drew has made a significant commitment to providing students in non-technically oriented disciplines with a computer education. At registration, each incoming freshman gets a personal computer. Drew President Dr. Paul Hardin says, "The emergence of high-quality word processors and rapidly developing software in specific disciplines now makes personal computers appropriate for all students in the liberal arts." The price will be tacked on to tuition. The 100-member Drew faculty voted overwhelmingly in favor of the new computer program. Computers will be used in courses involving writing -- English, history, sociology -- and later for foreign languages, art and drama.74

Predictably, MIT is the most computer-involved school. Its Project Athena is a 5-year project to integrate computers and communications capabilities into all phases of the educational process and thereby help sudents learn more creatively and fully in a wide range of disciplines. Grants from IBM and DEC fund this project.

Eric Johnson, assistant dean of engineering at MIT, says, "We hope to use powerful computational and graphics resources to help develop new conceptual and intuitive understandings and to improve and refine our teaching methods." Another MIT spokesperson says that students and faculty are "champing at the bit" to become totally involved with the program. "In the college of the future, computers will get the same attention as the campus library," she says.

For Project Athena, the IBM and Digital computers -- a gift in the $15,000,000.00 range -- will be made compatible, no small task in itself.

An English and computer science major described a game she was creating to teach foreign languages. The student types in sentences in the foreign language and then sees graphic representations of her word on the terminal screen. "This technique is not drill-like but exploratory," the creator said.

Why were IBM and Digital so generous? Public relations and student acculturation, a spokesperson says. If students get used to these machines, they will want and recommend them in their future jobs. "It's hard to get staff because private industry pays more, but Project Athena can be done -- if we are reasonably patient. We are going where the modern university wants to be in five years."75

BROWN UNIVERSITY was given $15,000,000.00 to develop a sophisticated networking system on campus, linking every dorm room, classroom and office. However, Jonathan Rotenberg, president of the Boston Computer Society and a Brown student, warns, "Most students don't know what's going on . . . it hasn't affected them yet . . . the network system already in place at Brown's Gould Lab has had a history of system failures over the past year and a half. When the computer system at Gould Lab doesn't operate properly, there are a few inconvenienced students, but if the entire Brown community were subjected to a network failure, the university would be paralyzed. Although Brown is far ahead of most other colleges, I fear it may be trying to accomplish too much."

Apple donated fifty Lisa computers to Brown for use in the arts and humanities departments.

CASE INSTITUTE OF TECHNOLOGY AT CASE WESTERN RESERVE, Cleveland, uses both micros and larger systems "to achieve rapid communication in a 'paperless' univerity. The computer lab runs seven days a week from 8:30 a. m. to 11:30 p. m. and plans to install additional computers in dormitories. Vice-President Don Schuele says, "Students who study at a paperless university will be better prepared for their future. When they get out of school, they will have intellisence on their desk, not just a dumb terminal . . . and they will do everything through electronic mail."

CLARKSON, Potsdam, N.Y., reports that all freshmen get a 16-bit Zenith Z-100 personal computer to be used during college. They pay each year and may purchase at graduation. The dean of educational computing says applications are up 25% since the new computer program. "What we're trying to teach students is how to think, not how to plug-in numbers . . . The only limitation on the Zenith computer will be a lack of imagination on the user's part . . .. Computers are what you make of them."

STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, N.J. was the first college to require that all of its freshmen -- 500 -- purchase micro computers.

CARNEGIE-MELLON UNIVERSITY formed a consortium of fifteen colleges and universities to examine and develop software applications on campuses. An impressive range of uses is planned: programs based on artificial intelligence which students can question as if questioning an authoritative source in the field; programs that simulate real-life situations for students to study and analyze; programs including data-base retrieval systems to help students search the library and centralized data bases; networks of personal computers for sharing information and programs throughout the higher-education community.

UNIVERSITY OF PITTSBURG announces a project known as the Campus of the Future. A.T.&T Information Systems has agreed in principle to jointly develop a multi-million-dollar computerized communications network with the university, similar to the network installed by A.T.&T. at Walt Disney's EPCOT Center near Orlando, Florida. The project will include the installation of a fiber-optic "backbone" or "central nervous system of the campus" electronically connecting 53 buildings at the university's main campus and three affiliated regional campuses.

The fiber-optic communications network will transport simultaneously the university's voice (telephone), data (computers) and video (TV) communications. "We hope to have the backbone in place in six months and the entire project completed in three years," an AT&T spokesperson says.

CARNEGIE-MELLON UNIVERSITY writing center is developing DRAFT, an integrated text editing information management program to aid

writers while they are composing and a second program to train students to detect textual problems which need revision. The writing center is also working closely with IBM to develop EPISTLE, a program to detect and correct grammatical errors and analyze style.

TEXAS A&M received a $608,000.00 grant from TI which brought in 100 of TI's IBM-compatible professional computers. All students in the Writing Specialization, a minor the English department offers to students interested in technical writing and editing, will be trained in the use of the computers. Word processing is the chief use contemplated. The computers are being used by faculty to train themselves now, but the terms of the grant require student use. 76

A far cry from this 'State of the Art' computer use are most of the colleges and universities I interviewed, but computers are being used in an interesting variety of ways.

NORTH SHORE COMMUNITY COLLEGE plans much greater use of the computer in their new campus learning center, which will have a CAI lab. At present they have the Stanford Writing Package of drill and practice grammar programs, but they have not yet been reprogrammed from Pilot to run on North Shore hardware. Under the direction of Anita Kaplan, the academic support staff is presently writing a computer grammar program.

Like most schools, North Shore sees the ability to program as a very small part of computer literacy. They stress instead familiarity with the machines, ability to run programs, word processing.

James Moore,co-coordinator of academic computer programs, believes IBM will eventually remove Apple from first place in educational hardware and software. He recommends IBM's Word Perfect. 'FACULTY RELEASE TIME IS THE KEY TO DEVELOPING GOOD SOFTWARE AND TO THE WHOLE ISSUE OF MAKING GOOD USE OF THE COMPUTER,' Moore says. He has been particularly impressed with the enthusiasm of the English department for the new tech nology.

Moore has a quadlink board which translates Apple software into IBM -- about $400.00 but cheaper than more terminals or micros, he says.

Sandra Stalker, chairwoman of the new department of computer and information sciences, extolls software for mastering parts of speech. "You can do it at your own pace, get immediate reinforcement and lots of tutorial help," she says. Knowing terminology and being able to use packaged software is the most valuable computer literacy for most students, she says.

UNIVERSITY OF LOWELL. Dr. Thomas Devine of the Education Department believes that the only worthwhile educational use of the computer is word processing. Unsurprisingly, he has seen nothing in computer programs except drill and practice and says, "The people who want to use these computer programs in their teaching are the same teachers who use workbooks -- in other words lousy, lazy teachers! Good teachers won't be using these programs because they'll be doing better things with class time than could possibly be done with the computer programs presently available. Dr. Devine referred me to Rebecca Carossa, who teaches technical writing at the U. of L. and teaches English at Chelmsford High School.

CHELMSFORD HIGH SCHOOL. CAI is big here and students as well as teachers are writing programs! Carosso herself is writing a book about CAI.

EMMANUEL COLLEGE. Chief use of computers at this time is the in-house-written drill and practice menu, according to Kathleen Henry, head of the freshman English program. Emmanuel hopes to make word processors available for "upper divisions" eventually. Inasmuch as Emmanuel has a journalism major, Henry believes students need practice writing and revising at the VDT. Very interested in an 8-step computerized revision program by Scribner called HOMER, Henry has been frustrated in her efforts to see and evaluate it, one of the main problems with software at this time.

Actually, Emmanuel has been at the forefront of computer usage in many content areas. The fact that they are still at the threshold in English usage probably reflects the dearth of good software.

BOSTON COLLEGE. Chairman of English Dennis Taylor says, "Call me back in a year and I'll have a lot more to say. . ." Boston College is part of a consortium getting about 100 Macintoshes at a cut rate. Taylor says his understanding is that there is not a lot to be done with the Macintosh at this point. "It has a single disk drive, so you have to keep taking out the main disk, and the disks hold only about twenty pages of double spaced writing, o. k. for undergraduates but not much good for graduate students or for faculty, who might wish to write a series of papers or a long work. Of course I'm spoiled because my secretary and I have a Display Writer (IBM's dedicated word processor) and that's so easy to work with that these small systems seem burdensomely inconvenient to me."

Professor Taylor believes it's useless to start from scratch looking for good software. He wants to find some place that has preselected software and will permit faculty to go in and evaluate it. He once went to the Harvard School of Education and they wouldn't let him see a thing! More recently, via a Harvard graduate school assistant, he got to see an interesting prewriting program that helps students formulate a topic, narrow it, generate copy but omits revision. He is definitely open and eager to computer possibilities in the teaching of English.

Professor Taylor will himself teach a course in Writing with the Word Processor next spring. "Most of the faculty are just now learning how to use the word processor, but we are all interested, intrigued with computer possibilities, and we will definitely take advantage of opportunities as they come up," he says.

SIMMONS COLLEGE. The chairman of English said, "Of course the use of word processors in English departments is happening all over the country and Simmons is thinking about that too, but we haven't yet moved in that direction."

EMERSON COLLEGE. Chairman of English James Randall said, "Of course everyone has computers in mind, but nothing is happening here as yet. Freshman composition is taught with a rhetoric, a reader and conferences. "Do you want to speak to the graduate student who supervises our freshman program?" Fancy that!

SUFFOLK UNIVERSITY. The chairman of English was unavailable, but another spokesperson said, "We are doing nothing with computers now, and there's nothing in the budget for next year. Inasmuch as every place is going computer, I suppose we will too eventually."

SALEM STATE COLLEGE. Dr. Thomas Luddy, chairman of English, said there is no use of the word processor or CAI in English courses at this time, though teachers are receiving some papers prepared on word processors. Salem State provides open access to both students and faculty for short courses in the use of the word processor, Luddy says. He foresees extensive use of computers for faculty and office support: preparation of syllabi, tests, records, scoring, etc. Referring to a recent issue of the College English Journal which described courseware, he said "This is very interesting to us, though such use is not imminent." Dr. Luddy referred me to Salem State's Writing Skills Center which provides a college-wide service on a walk-in or referral basis. "I believe there are two or three computer programs for remedial work . . . not state of the art and not as useful as they shuld be."

Interviews with Dr. Frank Devlin and Dr. Terry Kohn at the skills center indicated that Dr. Luddy was indeed correct. The programs, bought two years ago, are vocabulary builders and English basics and have not as yet been used by anyone, let alone evaluated.

"The picture for more CAI is interesting but vague," Kohn says. Dr. Devlin indicates that CAI is "a long way off for sure." He says they would have to do a study, make a thorough investigation, check out their facilities and just how software would work with their staff and how it would fit into their courses before they would consider adding it. "It's expensive," he says.

MIDDLESEX COMMU NITY COLLEGE. Dr. Kent Mitchell, chairman of the English department, sees computer use as at least two years away. "Word processing is used by the business students, of course, and the business letter is the best use of the word processor. For business applications, form letters, changing a word or two to personalize it, it can't be beaten," he says.

"It may be a prejudice of mine that the word processor is not particularly useful in writing courses. My feeling is that what

students don't do enough of is deliberate, think, reflect. What the word processor enncourses is just the opposite of what I think is important. I don't want more ways for students to be quick, thoughtless, to just spiel out anything. The word processor does not enco urage thinking -- the kind of thinking we're trying to encourage our students to do."

"In fact, " Dr. Mitchell says, "I've talked to a number of writers who say they do their revisions on paper and then type them into the computer. They don't revise on the screen! The hand-eye connection for writing is pretty basic. I doubt it will soon be replaced by the word processor. The computer is useful for tests, record keeping, standardized testing where you change certain things to get new tests and circumvent cheating. It's useful in libraries or to do research -- save your writing 1000 letters. The computer is chiefly useful as a tool for saving faculty from certain burdonsome tasks. My friends in computers say, 'Don't get yourself a home computer; you can figure it out in your head faster than you can get it into the machine.'"

Middlesex has two academic support systems going on: Special Services, a tutoring network with workshops as needed in study skills, reading a textbook, etc., headed by Stanley Hitron; the Individualized Education Center headed by Leah Knowlton, where remedial work takes place, credit is given for basic courses. Neither system uses the computer at this point, though the Individualized Education Center uses lots of programmed learning.

GORDON COLLEGE. Dr. Ann Ferguson, chairman of English, says, "I haven't seen any software that interests me" -- which I took to mean that she hadn't seen any software. Nor does she know what hardware the school has. "We might look into computers in another year or two," she says.

LESLIE COLLEGE Chairman Edmund Ostrander referred me to Professor Donna Cole, who is now piloting one computer assignment for freshman composition. "Introduction to Computers" is a required course for all students at Leslie, with a lab fee connected. Leslie is also interested in extending the word processing possibilities for freshman composition. At present Cole is using the computer for just one assignment, the research paper. The

teacher has short one-to-one tutorials with each student to see how she is respondng to the computer and how revising is going. The student completes the paper outside class, and the final draft is done on the word processor and letter-quality printer. The computer lab is supplied with Apples, and it's the usual shortage of hardware that limits the freshman composition use of the lab to one writing assignment.

ST. PAUL'S SCHOOL. DR. Richard Lederer, English chairman, described by the NEW YORKER Magazine as a "great bear of a man," got a grant to write programs for his English department. He describes himself as an "amateur," one who works for the love of it. The tutorial style of his programs and his enthusiasm for CAI are both beguiling. Advantages of the computer he lists include: responding specifically to each answer a student offers, leading him or her into the paths of correctness and insight; serving as a tireless drillmaster available to students any time they care to sit doown at the keyboard and dial a lesson; getting students out of the classroom --which itself has merit. Immediacy of response and immediacy of activity are the big pluses," Lederer says.

WELLESLEY COLLEGE. Dr. Terry Tyler, head of the resurrected required writing curse, says his college has twelve terminals from their DEC Main Frame in the library, four in the English building and twelve in the science area. Students have 24-hours-a-day access to the library computer study center. Security problems were solved by a card entrance to the back of the library. About one-third of the writing class students submit their work on computer printouts.

For the 1984-5 school year, Wellesley is bringing in personal computers -- IBM PC's with "Final Word" as the word processing software. Eight were delivered last spring, and more will be dispersed in the study center, the dorms and all over the college. With this availability, IBM PC's will be integrated into the required writing course.

"At least 90% of our students are computer literate, " Dr. Tyler says, "if literate means that they use the writing processor comfortably or in one way or another make use of the main frame."

NORTHERN ESSEX COMMUNITY COLLEGE. English chairman George Bailey says that one Advanced Composition Course is being taught with the word processor -- Apple II's and Bank Street Writer, a minimal word processing program. Only prerequisite for the course is English Composition 1 and 2 and, according to one observer, the students have a hard time adjusting to the machines. Northern Essex has a policy of permitting teachers to field test a course on "some kind of special topics basis" for two semesters. After two semesters, the course has to be either scrapped or proposed formally for adoption into the curriculum. Noone knows, at this point, whether the Advanced Composition with Word Processor will be continued. Bank Street Writer was used.

Mr. Eric Branscombe, director of the academic support center -- and much sought after for workshops on the conference method of teaching freshman composition -- feels that word processing programs are the only viable use of the computer for teaching English at this point. Branscombe feels the chief advantage of the computer right now is that students are very enthusiastic about them -- "But who knows how long that will last?" he asks. The computer programs he has seen have been no better than the workbooks which he wouldn't dream of using on paper and pencil -- so why expensively duplicate such thoroughly discounted software on a computer? Branscombe can foresee the usefulness of having a computer in the academic support center. He thinks the Bank Street Writer is a good program.

MERRIMACK COLLEGE. Dr. Catherine Murphy, chair of English (and former Endicott English teacher), says the use of computers is a year or two away for her English department. They are in the process of evaluating hardware and software and have requisitioned money for micro computers in the budget for this year.

Dr. Michael Rossi is the Merrimack English professor particularly interested in CAI. He hopes to get computers with word processing and editing capability for the writing center. Dr. Rossi represents the problem that the Educational Computer Specialist for Montgomery County, KY, described on the Educational Computer Profile TV program: "When I finally find software of good quality, I usually find that the quantity is not there to back it up." Rossi saw a demonstration of a program called

'Suspect Sentences' for teaching style. The screen showed paragraphs in various styles. The student was to write in a sentence anywhere in the paragraph and other students then attempted to tell which sentence had been added 'unprofessionally.' Of course the more successfully the style of the paragraph had been captured, the harder it was to tell. 'This was the only program I ever saw that dazzled me, that was sophisticated enough for higher education,' Rossi says. Yet when he tried to get more information abut acquiring the program, his letters were ignored. 'It must have turned into an orphan,' he says.

Subsequently I learned from Bonnie Howard, bursar of Intentional Educations, that Suspect Sentences is their program but not yet marketed. What often happens is that attractive software is demonstrated at conventions and conferences months or years before it can be marketed. Getting programs to the market is a long, slow process, she says.

UNIVERSITY OF MASSACHUSETTS, Boston. According to the May 20 Sunday GLOBE MAGAZINE, 40% of U. Mass students work full time, anther 40% work part time. As a result, teaching freshman English with the word processor has not been successful. It is just not possible for such hard-workng students to put up with long waits for time on the computers, teachers say. However, Professors Mary Ann Ferguson and George Smith, cochairs of English and Professor Louise Smith, director of freshman composition, feel that teaching freshman composition with a word processor would be ideal at a residential college.

Dr. Mary Gainoir and three colleagues have been writing a spelling program, essentially drill and practice with some tutorial branching, which they hope to have accessible for students this year.

PINE MANOR COLLEGE. Professor Trish Macvaugh, director of freshman composition, is enthusiastic about the use of word processing in writing courses. At present the upper level writing classes have access to the word processor and Prof. Macvaugh's goal is to extend this use. Pine Manor's president has encouraged all faculty to learn word processing, she says.

As for software, Prof. Macvaugh has seen none that merits the expense. She described one delightful program which she saw demonstrated. The prose of professional authors was put on the screen next to imitation paragraphs. The students chose the professional model. "Of course you could do the same thing with handouts, so why use a computer," she asked.

BOSTON UNIVERSITY. Dr. Harry Crosby at the College of Basic Studies says, "We take the losers and turn them into winners." Dr. Crosby stresses the importance of selectivity in evaluating and using software. Wandah, a word processing and text editing program which was strenuously promoted at the 4 C's Conference, he considered an uncreative use of the computer.

The College of Basic Studies has developed a statement of their philosophy regarding CAI which is in the Appendix of this report.

One faculty member has been working for years on a computer program. "When you add testing with students and evaluation by faculty to the design and programming of software, it takes a long time," she says.

MINUTEMAN REGIONAL VOCATIONAL SCHOOL. English Chair Earl Hancock believes that computer programs work especially well with remedial students. "They enjoy the work and clamor for more," he says. John Capano, who directs the student computer center, confirms the enthusiastic use of software. The number of engrossed students I watched doing drill and practice programs, simulations, tutorials and instructional games proved the popularity of CAI with this school's essentially developmental students.

Both software and hardware were chiefly Apple. "The advantage of Apple, Hancock explained, is the tremendous amount of educational software available for it. However, some good programs have buss. and when he points them out to Apple, the response is, "Why should we fix them?" Their programs have been selling all right with the buss. Such arrogance will change with more competition.

DARTMOUTH COLLEGE has received a $500,000 grant for extension of the college's computer network to all student dormitory rooms by September, '84. The grant will pay for wiring and installation of

communication outlets in dorms that will link the students' computers to each other, to computers in other academic and administration buildings on campus and to the central main-frame computers in the computation center.

In the late 60's, John Kemeny and Thomas Kurtz of Dartmouth developed the Basic language for main frame computers. Basic is an acronym for "Beginner's all-purpose symbolic instruction code." Dr. Kemeny is now the president of Dartmouth College.

CATHY DRAPER has a home-based business as educational consultant and tutor. "In schools right now the three chief computer purchases are Apple -- way out front with 60% to 80% of the market; TRS-80; Commodore, least of all. Others, like IBM, are in the running after these three, but the situation could change fast."

Apple is out front chiefly because of its extensive educational software, Draper says, but as more and better software becomes available, Apple will not provide "the most bang for the buck." Like so many others, Draper sees the computer as one tool among many. "It's a left-brained tool, sequential, structured and potentially boring if used all the time," she warns. She compares the computer to the overhead projector, which teachers resisted at first. "Teachers will have to be retrained to use the computer -- and considerable time and money will be necessary for this. Most teachers have simply not yet had the training to use the computer creatively." She envisions the classrooom use of the computer as in a learning center, one area where students work individually while teachers interact with other students.

DR. JOHN H. STRANGE, President, Acadia Educational Enterprises, New Technologies and Educations, says, "My own inclination is to take the heed of Seymour Papert in MINDSTORMS, and to use the computer for word processing rather than for any of the tutorials." The word processor is useful from finishing drafts to constantly revising texts, Strange adds.

MARIE CAHILL, Abbot Library Computer Workshop, Marblehead, says, "90% of computer users will have no need to program or know how to program. Learning to program is NOT learning to use the micro computer," she says. A former English teacher, Cahill says the

computer as word processor is the most obvious and important potential of the computer for teaching writing. Dot Matrix printers, cheaper than letter quality printers, are adequate for many purposes, she says. Disks are more expensive than tapes, but vastly superior. She says floppy disks, some 8", some 5 1/4", will be used for education more than hard disks.

GRETCHEN MARKS, owner of a home-based "my Secretary" computer business, says, "Prejudice has no place in the evaluation of your computer needs. Sometimes people just buy an IBM because they've heard it's the best when it may not best serve their needs at all. Before buying, make a thorough analysis of what you want to do with your computer. Consider all the 'what if's.' Marks believes there will be only six computer firms left by 2000 A.D.: Wang, Digital, IBM, Radio Shack, Hewlett Packard and Apple. She believes the dedicated word processor (computer that does nothing else, the word processing is in ROM) is obsolescent. Marks herself is devoted to the TRS-80 and uses that microcomputer exclusively in her business. Green is easiest on the eyes, she says; white on black the worst.

MARBLEHEAD ADULT EDUCATION. Steve Fein, computer literacy teacher, says his biggest problem teaching basic to adult education classes is the number of adults, especially men, who can't type. "I think typing is so essential," he says, "that my 14-year-old son has already graduating from Marion Court's typing course."

NANCY DUBE, EDUCATIONAL SPECIALIST AT THE NORTHEAST REGIONAOL EDUCATION CENTER, says she was the star of her computer course because, having been a secretary, she typed faster than her fellow students. Typing skills are essential to computer use, she says.

Will graphics beat out language?

A curious disagreement among computer experts and theoreticians as to the use of graphics emerged recently.

Dr. Gina Burchard of Texas A & M University maintains that as Computer Based Education (CBE) and Computer Assisted Instruction (CAI) continue to expand and increase in sophistication, writing,

even as word processing, will become less and less a medium of communication and more and more a supplement to interactive graphics. 'Graphics are fast outstripping the power of writing in technical tr aining; the function of language changes in response to advances in computer-graphics technology until verbal communication eventually becomes not the primary medium, but the 'glue' providing coherence for graphical communication.

B. F. Skinner could'nt disagree more! He takes a curmudgeonly stance about fancy graphics and game formats that try to compete with arcade-style video games. He is adamant against programs that try to 'jazz up' the material. Accordi.ng to one reporter, his advocacy of straightforward CAI with few or no frills may cause those who prefer the more interactive, exploratory and game-type software to grit their teeth. 'The main thing, ' Skinner says,"is straight programmed instruction and the design of well-tested programs to teach basic subject matter. . . When you refrain from jazzing up a program to give students false interests, you're actually letting them discover they can learn something . . . If by adding color illustrations to textbooks or animations to computer software we are seeking only to attract students' attention, then we may actually be distracting them from what we want them to learn.' What Skinner calls 'the fancy stuff' reinforces looking at the picture or turning on the computer. It doesn't necessarily reinforce reading the text or doing the program, according to Skinner. In an effectiive 'schedule of reinforcement' the reinforcement comes when the student has successfully completed a segment of the work, not before.

The program should be broken into segments small enough for the student to succeed frequently, Skinner believes. Computer graphics and animations could be used as reinforcers throughout a program, but Skinner believes they are not necessary. . .'The feelings of mastery and successful completion are enough.' His interviewer adds, 'There's nothing more irritating than a cutesy animated sequence used to dress up a banal program.' Skinner's opinions may come as good news to teachers who want to design their own courseware but don't have the facilities, training or time to create elab orate graphics. Skinner says, 'The main thing in programming is to break the subject matter up into small steps that are easily taken. The steps should progress so that after

you've taken one, you're in a better position to take the next. You need to learn immediately whether or not you've been successful. There should be no penalties attached to failure, no testing going on. Slowly you find yourself doing more and more things successfully.'77

Dr. Michael Southwell of York University, Long Islnd, expressed reservations similar to Skinner's at a recent 4 C's conference. And Dr. Hugh Burns at the same conference described a clever animated cartoon of a lumberjack who hacked up some bad grammar usage. The clever device used up lots of RAM and whatever point the lumberjack was trying to make was completely lost by the distraction of the graphics, Burns said.

What are the social, ethical and political implications of computers in education?

As instructional computing spreads through the United States, questions of its ultimate effect on society spread with it. Most commonly asked: Will computers increase inequality between races, economic levels and sexes?

Bonnie Howard of Intentional Educations, a computer software company, says the evidence is already in that school computer clubs are predominantly male in membership. One explanation for this, according to game designers, is that most games have been designed by men. They are male fantasies, microworlds. When exciting games are created by women, girls will perhaps become more involved.

The NEA reports that rich districts have more computers than poor ones. Market Data Retrieval, Inc., reports that last year instructional computers were available in 80% of the nation's 2000 largest, richest high schools -- but in only 40% of the smallest, poorest ones.

As children in poorer districts have less access to computers, so do minority children, who are more likely than others to live in

such districts. Unless this is changed, the resulting gap in computer literacy will reinfoce the income gap between the races.

But schools are not the only victims of economic dislocations. In his article, "Fast Times for High Tech," David Noble quotes Fred Branfman, former economic advisor to Governor Jerry Brown of California, who says, "An enlightened government would be trying to find ways to broker a deal between . . . labor and high-tech industry that would unleash the technological juggernaut but also establish some basic social safeguards."

> The first goal of any political program must be to produce prosperity. The private sector can't produce steady growth anymore. The conservative charge that 'leftists know only how to cut up the economic pie -- they don't know how to expand it' is important now because without new wealth there will be nothing to redistribute.
>
> The beauty of high tech is that it could enable us to produce economic growth without tearing up the earth or ripping off the third world's resources. In the past, growth was spurred by housing, steel, cars and energy -- all of which consumed vast amounts of natural resources. But computers, robotics, telecommunications and bioscience are all relatively resource-efficient.
>
> The kinds of safeguards I have in mind are job retraining for those displaced by the new technologies; shorter work weeks; union protection so jobs will be safe and pay decently. The dangers implicit in NOT managing the 'next economy' are immense. That's based on statistics, not on some apocalyptic vision. There are already more homeless and hungry people than ever before in our postwar history.79

In his article, "And Man Created the Chip," Merrill Sheils addresses similar issues: Smart machines bring with them the seeds of widespread economic dislocation and social unrest. Eventually

theywill make possible the full automation of many factories, displacing millions of blue-collar workers with a new 'steel-collar-class.' Even office workers will feel the crunch, as smart machines do more and more of the clerical work. Traditional businesses such as TV networks and publishing companies will encounter new competition as programmers and advertisers beam information directly into the consumer's home. If the automobile industry had improved its technology at the same rate computer science has, it would now be turning out Rolls-Royces that cost no more than $70.00 apiece.80

Plainly, these and all other issues related to the computer revolution shuld be dabated in our liberal arts departments. Perhaps that is why Dr. Stronge believes that computer departments belong in liberal arts.

Joseph Weizenbaum states the case for teachers taking responsibility for their use of computers passionately:

> The salvation of the world depends only on the individual whose world it is. Every individual must act as if the whole future of the world, of humanity itself, depends on him. Anything less is a shirking of responsibility and is itself a dehumanizing force, for anything less encurages the individual to look upon himself as a mere actor in a drama written by andymous agents, as less than a whole person, and that is the beginning of pasivity and aimlessness. . . Chief among our duties to one another is that we instruct one another as best we can. And the principal and most effective form of instruction we can practice is the example our own conduct provides to those who are touched by it. Teachers and writers have an especially heavy responsibility, precisely because they have taken positions from which their example reaches more than the few people in their immediate circle.
>
> I would put all projects that propose to substitute a computer system for a human funtion that involves interpersonal respect, understanding and love in the same catesory. I therefore reject Dr. Kenneth Mark

> Colby's proposal that computers be installed as psycho-therapists, not on the grounds that such a project might be technically infeasible, but on the grounds that it is immoral . . .
>
> The second kind of computer application that ought to be avoided, or at least not undertaken without very careful forethought, is that which can easily be seen to have irreversible and not entirely foreseeable side effects. If, in addition, such an application cannot be shown to meet a pressing human need that cannot readily be met in any other way, then it ought not to be pursued . . . The example I wish to cite is that of the automatic recognition of human speech. There are now three or four major projects in the United States devoted to enabling computers to understand human speech. . .
>
> Perhaps the only reason that there is very little government surveillance of telephone conversations in many countries of the world is that such surveillance takes so much manpower. Each conversation on a tapped phone must eventually be listened to by a human agent. But speech-recognizing machines could delete all 'uninteresting' conversations and present transcripts of only the remaining ones to their masters. Why should a talented computer technologist lend his support to such a project? As a citizen I ask, why should my government spend approximately $2,5000,000.00 a year (as of 1975) on this project?81

As responsible citizens in the Weizenbaum sense, teachers have an obligation to reject poor software and to do what they can to ensure the development of good software. Secretary of Education Terrel Bell recently said, 'I would like to emphasize that I believe very strongly that if computers are to play the role they ought to in our schools, we have to turn to software development. I'm willing to give that the highest priority in the Department.' Earlier remarks by Bell characterized educational software as 'electronic page-turning,' so his current willingness to commit federal funds to

software development represents a change -- and deserves encouragement. Bell says he has little actual discretion in the allocation of his funds, most of them committed to ongoing projects, and he needs public support to use funds for software development. Teachers must contact their congress people, he emphasizes.

Stanley Postrow, Associate Professor of Humanities at Montana State University, said in a recent TV computer show, "If we look back on today's computer situation four years from now, we're going to say that computer use was silly and counterproductive. Instead of waiting four years, we need to start right now developing educational theories and getting the right help from the federal government to use the computer well. Obviously young people are different from 'us' if only because they got up on Saturday mornings and watched TV instead of reading a book. They are highly developed visually. There is now this wonderful tool which can capitolize on this visual orientation, but it is not yet being used well."82

Postrow says first we have to work out those theories that produce good software. Software is the problem, not hardware. WRONG IS HANDING OUT MONEY SO SCHOOLS CAN BUY COMPUTERS, Postrow emphasizes. Computers are of no earthly value withut good software. Over and over Postrow stressed the need for federal funding of software development. "We are in the 5th generation now of software. Where big bucks were involved -- the oil industry, medicine, defense -- the software is great. There is no similar growth in educational software because education does not represent big bucks. The federal government has to get involved and push for programs that lead to software. The technological possibilities of computers in education in three-four years can only be realized if the federal government helps that guy who has created something good but has no way to market it. Other industry has venture capital; for education it has to come from the feds."

George Leonard agrees with Postrow. "Good curriculum development is expensive, but it is a good investment. We might as well face the fact that some federal funding will be required. Courseware should not be fragmentary but the structure of the whole curriculum." 83

Eugene Galanter warns against our getting carried away by ideas of literacy spreading throughout the world, borne by the computer. "It

won't happen nor could it. The intrinsic merit of the machine is its impressive technology. Parents are overwhelmed by the incredible capabilities of something so small and so cheap. But a child, who knows nothing of this technical tour de force, finds that working at the spelling machine may be as intrinsically boring as a classroom or a workbook session. . . The computer will turn drudgery to Joy? Nothing could be further from the truth."84

On the other hand, Neil Frude worries that computer systems will be so attractive, absorbing and diverting to children and adults that they will curtail normal involvement with other human beings. A decrease in human sympathy or affiliations is a high price to pay for sophisticatedd technology, he says. 85

There is certainly no need for teachers to worry about being replaced, most educators agree. Galanter says, "This need to be taught by a human teacher seems to be thoroughly documented in the history of education. Even learning how to use a computer, which some think may supplant teachers, requires the same personal touch and understanding of the pitfalls and confusions that are often unique to each person . . ." 86

B. F. Skinner, too, says that computers can relieve some drudgery and help prevent burnut for teachers, not replace them.

What are the best social implications of computers then? Galanter thinks they can help us to think better and therefore to live better.

> The ability of computers to do some things better than a person is like the ability of a steam shovel to move more earth than a man. Obviously, we invent devices to reduce the effort we expend in work, but we do not want our own work to vanish. . . There is no way in principle to protect our own intrinsic value as human beings if our work, or whatever else we do, is all that we represent. Machines will certaily replace us in most if not all the things we now do. What then is our intrinsic purpose? The answer to that question when stripped of its mystical overtones must be that we should lead a full and good life. Some of that endeavor, if not the major part of it, must depend on

> our mental activity. To some extent we design and define the universe we live in. To that end the effective use of our minds is part of our biological and spiritual heritage. To expand that function is to enhance our lives.
>
> Thinking better must be the one effort that should serve to occupy our lives. Ways to improve our lot always have and always will depend on the use of our minds. Whatever accomplishes this enhancement to our thinking gives humankind an added edge on survival. If anything will protect us from self-destruction in one form or another, it will be the power of thought to move the world. Such thinking may take many forms. Indeed, it may lead us to new spiritual adventures as well as material advances. But in the final analysis we need to hone our minds to a sharp edge and to use that tool to rededicate ourselves and our children. The puny measures we have used with such success in the past surely show that faith in our mental powers can move mountains. Perhaps the new skills demanded by this new artifact, the microcomputer, can augment our arsenal. The historical record demonstrates that our intellectual efforts have always added to our material well-being. Perhaps some new improvements in our modes of thought can do as much for our social existence.87

And perhaps minds honed to their finest edge can permit teachers to reconceptualize the teaching of English. The need for such reconceptualizing was the thrust of one program at the 4 C's conference. The railroad almost went under, it was pointed out, because it did not reconceptualize into the transportation business. Window shades did reconceptualize as the light control business. Hostess Cupcakes had to decide whether they were in the dessert or candy business. Xerox, when their only product was the office copier, reconceptualized themselves as 'the automated office suppliers business,' thus subsuming the xerox machine but adding new products. What business do English teachers think they are in -- and what business are we really in? There has already been a revolution in the

teaching of writing from an emphasis on product to an emphasis on process.88 The teacher's role with the new technology is still to help students to write clear, presentable prose. However, the motivation of students to write on the computer may -- for the first time in many cases -- convince students that writing really is important.

What are the recommendations for Endicott?

In the light of all these questions and tentative first guesses at answers, five recommendations for Endicott emerge as particularly important.

TYPING IS ESSENTIAL

The most important recommendation regarding computers is that all students from here on in must know how to type -- no matter what their majors, no matter what their short or long-term goals. Every teacher, writer, programmer, designer in the computer field agrees on this.

Never again will typing be the special province of secretaries and clerical workers. A recent TIME Magazine described one frustrated executive trying to learn to use the computer and lamenting, "I run a multi-million dollar business, but I can't find 'A' on the keyboard." Executives who can't take advantage of computers are executives with a serius handicap.89

Inefficient as the "Qwerty" keyboard --named after the six letters that start the top line --may be, it has been built into so much hardware and learned by so many generations of typing students that it's here to stay. One benefit of the computer is speed -- a benefit lost to hunt and peck typists. Feminists who have religiously avoided the typewriter on the premise that they were destined for something better must change their thinking.

William Zinsser, in a book which has become an instant classic, WRITING WITH A WORD PROCESSOR, says it best:

A word processor has the same basic keyboard as a typewriter; therefore anyone who uses it must know how to type. But a surprising number of otherwise competent professional people -- especially men -- have never learned this fundamental skill. For many men it's a sexist hang-up: typing is something women do. It's all right for men to type if they are writers; their image has been validated by macho authors like Hemingway and by movies about tough reporters in snap-brim hats. But for a man with executive ambitions to sit down at a typewriter and bang out a memo or a letter is an indignity . . .

With the advent of computers it will be crucial for managers and other people who work in offices to have "keyboard skills". . .

Anybody can learn to type. It's one of those skills that becomes habitual with practice, like driving a car. . . Don't get stuck with the hang-ups of today when everyone else is flourishing in the office of tomorrow.90

SOFTWARE COMES FIRST

Software decisions are the most important decisions to be made in the use of computers for education. When good software is found, the hardware decisions are easy: Just buy whatever hardware runs the software -- for the least money. No amount of wonderful hardware will help educationally if really good software is not availale for it. Right now, though excellent programs are alleged to be in the works, not much is available.

Of course this gives teachers the responsibility of evaluating software. The hardest part may be getting to see software. That achieved, English Educators list seven criteria to consider when

examining software designed for use in process-based compositin courses. These criteria are listed under the section, "How should English teachers evaluate software?"

MICROCOMPUTERS MAKE THE BEST SENSE

Three, the wave of tthe future seems to be microcomputers. The problem with terminals from the main frame is that a problem with the main frame can throw a whole class out of business. With personal computers, a glitch in a machine inconveniences only one student. Excellent word processing programs are available for all personal computers.

WORD PROCESSING IS CERTAIN TO BE USEFUL

Four, at this time word processing appears to be the most useful way to use computers to help students improve their writing. Giving students a chance to use the word processor and print out their papers may improve their writing. It will certainly help to prepare them for their post-graduation working world.

According to Zinsser, a word processor can turn writing into a pleasure and releases creative energies that are now largely blocked. "Children, of course, would have to learn to type at an earlier age. But typing is a skill that they'll always need; they might as well get an early start on it. I can't think of a quicker way to give them a sense of the enjoyment that comes from playing with words -- words in all their fanciful shapes and sizes and combinations -- than to let them write on a screen where all things are possible and all mistakes are instantly forgiven, where the touch is light and the page forever tidy."90

SEARCH FOR FUNDS!

Moving more vigorously into the world of computers for English -- or any other discipline -- involves MONEY. Implementing most recommendations involves expenditure. For that reason, perhaps the most important recommendation for Endicott College is to begin a search for funds. We may not be likely candidates for $15,000,000.00 but could other grant and gift possibilities help fill our expanding needs? A new emphasis on computers in fund raising might capture the imaginations of alumnae. Certainly this effort deserves the enthusiastic support of the whole Endicott community.

What, only five recommendations?

No, a million more come to mind. For starters, I envision a room full of word processors, just like the present typing classrooms,

I would like to see short word processing courses, maybe seven weeks, available to both students and faculty.

I dream of micro computers in every department, ready to help faculty prepare syllabi, tests, handouts, reports.

Access for faculty, maybe students too, to a letter quality printer could be another long-range goal, after readier access to micro computers becomes a reality.

Of course other possibilities for computers are in the offing. Five more main recommendations may make sense next year. But my sabbatical is at an end. Though I no longer dream of becoming rich myself, I do want to leave you with words from one of the world's one-time richest men. J. Pierpont Morgan was once asked, "What's going to happen to the stock market." He answered, "It will change. Plan accordingly." Good advice for Endicott College as it adapts to the Computer Revolution.

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3 Quoted by Dr. Stranse.

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6 Dr. Eusene Galanter, KIDS AND COMPUTERS: THE PARENTS' MICROCOMPUTER HANDBOOK, (New York: Perisee Books, 1983), p. 51.

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The Middle Ages were Labor Intensive.....

The Industrial Age was Machine Intensive.....

The Computer Age is Data Intensive!

"To my data, right or wrong."

RESEARCH ON COMPUTERS AND COMPOSING
Mimi Schwartz - Stockton State College
CCCC - March, 1984

SHIFTS IN STUDENT ATTITUDES TOWARDS COMPOSING

POSITIVE SHIFT IN INVENTION AND REVISION ATTITUDES - from pre and post questionnaires by 86 students in 3 computer-based writing sections and 3 non-computer-based sections:

	INVENTION		REVISION	
	Begin with ease	Confident ideas will flow	Think about spelling after first draft	Multiple drafts are okay
Computer Group:	47%	40%	35%	47%
Control Group:	32%	21%	29%	14%

NEGATIVE SHIFT IN INVENTION AND REVISION ATTITUDES - from pre and post questionnaires by 86 students in 3 computer-based writing sections adn 3 non-computer-based sections:

	INVENTION		REVISION	
	Begin with difficulty	Anxious I'll have nothing to say	Think about spelling during first draft	Single drafts if possible
Computer group:	8%	9%	16%	19%
Control group:	19%	23%	31%	40%

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Mimi Schwartz -"Computers and the Composing Process"
Stockton State College, NJ

INVENTION AND REVISION -- WITH A COMPUTER

STEP 1: Writer begins with an invention program such as PREWRITE in order to develop topic ideas. The printout, which results from a series of computer-prompted questions, becomes notes for a first draft:

Sandi Mackey

PREWRITE ABOUT:
Soap Operas and why I like them

TITLE:
Hooked on Soaps

PURPOSE:
To find out why soaps have so much afternoon power. What's the lure?

QUESTIONS TO ANSWER:
1) Who watches soaps?
2) Why do they like them so much?
3) What did people do before General Hospital?
4) When did I get hooked?

REASON FOR TOPIC CHOICE:....

[from PREWRITE, © Mimi Schwartz, 1984]

STEP 2: Writer composes a full draft - either beginning directly on the computer or by transferring a hand draft to a disk:

Hooked on Soaps

Here I sit watching my soap and daydreaming at the same time. Daydreaming about how happy these shows have made alot of people, especially the housewife who must stay home or the person confided to a hospital bed with only the television for companionship. I myself, have been watching soaps from the wee age of five. I would come home from school and my mother wouldn't let me go out and play until my homework was done. Little did she know that I would go into the kitchen and make it appear as though I were working diligently, but in actuality I would be standing in the doorway quietly watching her soaps and not really understanding the mature subject matter. All that happened fifteen years ago and I'm still hooked on soaps...

BOSTON UNIVERSITY COLLEGE OF BASIC STUDIES COMPUTER STATEMENT

Computers and Instruction in Rhetoric - C.B.S.

Background. For some time the Rhetoric faculty has been thinking about computers and their use for the Rhetoric Department. Professor Burton, who has a computer terminal, has been working with computers since 1965; Professors Estey, Stiffler, and Crosby have their own personal computers, and Professor Trainor uses one. Professor Burton is preparing a program to provide critiques for themes submitted via the computer. Professors Carter and Bond have had preliminary instruction on computer use.

For the Department meeting of September 23, 1983, Professor Estey proposed an agenda addressing three questions about computers: (1) What can computers do for students? (2) What can computers do for teachers? (3) What problems can they create? He suggested as speakers Professors Burton, Stiffler, and himself. At the meeting, dialogue fell into three categories: (1) computer literacy for students, (2) computer-assisted instruction, and (3) computer-based instruction. From that and subsequent discussions, the Division has prepared this statement. Since our convictions and decisions impinge on the responsibilities of other divisions and the administration, we are making this statement available to the entire College.

Computer Literacy. Insofar as students are concerned, CBS is missing a competitive enrollment and retention advantage versus other schools. Although we feel no responsibility to teach programming to students, we do agree that students qua writers would be helped if they could use the composition and editing modes of a word processor. Most faculty can be helped greatly if they use both the computer and the word processor, and we applaud the Dean for paying for instruction and for providing both terminal and personal computers.

Computer-Assisted Instruction (CAI). Professor Burton already uses computer assistance to provide more meaningful and efficient critiques for student papers. She and Professors Crosby, Estey, Stiffler, and Trainor prepare syllabuses and handouts with computers. Professor Stiffler has devised a program to keep extensive grades and statistics for his classes. Professor Crosby prepares extensive theme critiques keyed to marginalia on students' papers.

Computer-Based Instruction.(CBI) Professors Bond and Trainor are embarked upon new methods of teaching grammar; these methods may lend themselves to computerization; Professors Stiffler and Carter are working on a system of pre-diagnosis to determine which students should have remedial training in mechanics and in determining gain from such training. Having

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that there is software available to teach typing [illegible], spelling, and punctuation to students, the Department is [illegible] the effectiveness and cost of such equipment--and the computers to run them. Professor Burton has learned that such instruction is not available to students via the University main frame.

The Rhetoric Responsibility for Computer Use at CBS. (1) We agree with Joseph Weizenbaum and Seymour Papert that the best training for computer use is for students to be able to think and write well. We will continue with this training. (2) We will try to develop our own skills to enhance computer-assisted instruction. (3) After our study of software, we expect to suggest installation of a small number of computers and word processors in the Study Center to provide typing instruction, grammar/spelling/punctuation help, and computer familiarity. (4) We will continue to study compatability of our own uses with thought to ordering a computer/word processor for Department use. Professors Burton and Estey are interested in further investigation, thinking of equipping a classroom with computers, a control module, and a large screen. As part of the current departmental overview which precedes Harry Crosby's recirement from the chairmanship, Randall Stiffler will chair the department's development of an action program for computer use.

Recommendations for CBS Faculty. We suggest that this statement be considered by the rest of the faculty. They may wish to ascertain their interests, needs, and possibilities--with a view toward developing a unified computer prgram for CBS. Medgar Evers College (CUNY) has a classroom with 30 terminals which are used to teach a one-semester course in mathematics; it is possible that CBS can solve its curricular deficiency in this way--and at the same time enhance student computer literacy.

Distribution:
Rhetoric faculty: Bond, Burton, Carter, Crosby, Estey, Stiffler and Trainor

Deans Gilbane, McIntire, and Emery

JOSEPH
FARRIS